

On a collection of Polyplacophora (Mollusca, Amphineura) from the bay of Biscay

by Piet KAAS *

Abstract. — The present paper deals with a collection of Polyplacophora (Mollusca, Amphineura) dredged in deep parts of the bay of Biscay (330-4 825 m) during several French expeditions. The specimens belong to at least 10, possibly 12 different species, of which 3 (5 ?) are new to science: *Leptochiton leloupi*, *Leptochiton tenuis* and *Connexochiton* (new genus: Isechnochitonidae) *platynomenus*. Other species recorded for the first time from the bay of Biscay are *Placiphorella atlantica* (Verrill & Smith) and *Isechnochiton exaratus* (G. O. Sars).

Résumé. — Étude d'une collection de Polyplacophores (Mollusca, Amphineura) dragués à grandes profondeurs (330-4 825 m) dans le golfe de Gascogne par diverses expéditions françaises. Les échantillons représentent 10, peut-être 12 espèces dont 3 (5 ?) sont nouvelles: *Leptochiton leloupi*, *Leptochiton tenuis* et *Connexochiton* (nouveau genre: Isechnochitonidae) *platynomenus*. Les espèces *Placiphorella atlantica* (Verrill & Smith) et *Isechnochiton exaratus* (G. O. Sars) sont signalées pour la première fois du golfe de Gascogne.

Dr. M. SEGONZAC of the Centre National de Tri d'Océanographie Biologique (CENTOB), Brest, France, sent to me 24 samples containing 54 specimens of Polyplacophora, for identification. The specimens were collected in deep parts (330-4825 m) of the Bay of Biscay during different dredging expeditions. All specimens are preserved in alcohol.

Dr. Ph. BOUCHET, curator in the Mollusca section of the Muséum national d'Histoire naturelle, Laboratoire de Biologie des Invertébrés Marins et Malacologie, Paris, sent me in addition 16 samples, containing 20 specimens, of which 19 preserved dry, from the Bay of Biscay, 3 samples (4 specimens) in alcohol from the Açores and one dry sample (3 specimens) from off Tromsø, Norway, also from different expeditions.

The specimens belong to at least 10, possibly 12 different species of which 3 (5 ?) are new to science. Two others are recorded from the Bay of Biscay for the first time.

I owe much thanks to Dr. SEGONZAC and to Dr. BOUCHET for kindly entrusting me their valuable material. The holotypes of the new species as well as the bulk of the remaining specimens are stored in the collections of the Muséum national d'Histoire naturelle, in Paris; one paratype of the new species and a few other specimens are now part of the author's collection.

I followed the classification drawn up by Mr. Allyn G. SMITH in "Treatise on Invertebrate Paleontology", pt. I, Mollusca, 4 (University of Kansas Press, 1960), revised in MS, 1975.

The species, listed in systematical order, are:

* *Steenvoordelaan 104, 2284 CZ Rijswijk, Pays-Bas.*

Class POLYPLACOPHORA
Subclass NEOLORICATA
Order LEPIDOPLEURINA
Family LEPIDOPLEURIDAE

Leptochiton Gray, 1847. Type : *Chiton cinereus* Montagu, 1803 = *Chiton asellus* Gmelin, 1791 (non *Chiton cinereus* Linnaeus, 1767).

1. *asellus* (Gmelin, 1791)
2. *alveolus* (M. Sars MS, Lovén, 1846)
3. *cancellatus* (Sowerby II, 1840)
4. *leloupi* nov. sp.
5. *tenuis* nov. sp.
6. sp. 1
7. sp. 2

Family HANLEYIDAE

Hanleya Gray, 1857. Type : *Hanleya debilis* Gray, 1857 = *Chiton hanleyi* Bean in Thorpe, 1844.
8. *hanleyi* (Bean, in Thorpe, 1844)

Order ISCHNOCHITONINA
Family ISCHNOCHITONIDAE
Subfamily Ischnochitoninae

Connexochiton nov. gen. Type : *Connexochiton platynomenus* nov. sp.

9. *platynomenus* nov. sp.

Ischnochiton Gray, 1847. Type : *Chiton textilis* Gray, 1828.

- S.G. *Stenosemus* Middendorff, 1847. Type : *Chiton albus* Linnaeus, 1767
10. *albus* Linnaeus, 1767
 11. *exaratus* (G. O. Sars, 1878)

Family MOPALIIDAE

Placiphorella (Carpenter MS) Dall, 1879. Type : *Placiphorella velata* Dall, 1879
S.G. *Placophoropsis* Pilsbry, 1893. Type : *Placophora (Euplacophora) atlantica* Verrill & Smith, 1882.
12. *atlantica* (Verrill et Smith, 1882)

DESCRIPTIVE PART

Only the new species will be described in this paper.

1. **Leptochiton asellus** (Gmelin, 1791)

MATERIAL : « Jean Charcot », campagne d'essais, st. 13 ; 4-12-1968 ; 153-158 m ; 06° 46 W, 48° 23 N : 4 specimens, dry.

A well-known species from both sides of the North Atlantic, previously recorded from the area.

2. *Leptochiton alveolus* (M. Sars MS, Lovén, 1846)

MATERIAL : Biogas II, sample DS 34 ; 20-04-1973 ; 1 031 m ; 47° 41 N, 08° 05 W : 1 specimen, disarticulated. — Biogas V, st. 6 ; sample CP 07 ; 21-06-1974 ; 2 170 m ; 44° 10 N, 4° 16 W ; 1 specimen, curled up. — Biogas VI, st. 4 ; sample CP 16 ; 25-10-1974 ; 4 825 m ; 46° 27 N, 10° 26 W ; 1 specimen, curled up.

“Thalassa”, st. Z 400 ; 22-10-1973 ; 1 175 m ; 47° 33 N, 07° 19 W : 1 specimen, disarticulated. — st. Z 406 ; 23-10-1973 ; 1 055 m ; 47° 44 N, 08° 04 W : 1 specimen, curled up — st. Z 409 ; 23-10-1973 ; 1 035-1 080 m ; 47° 43 N, 08° 04 W : 5 specimens, curled up — st. Z 421 ; 24-10-1973 ; 950 m ; 48° 22 N, 09° 33 W ; 2 specimens, curled up — st. 422 ; 24-10-1973 ; 1 175 m ; 48° 21 N, 09° 39 W ; 1 specimen, dry, curled up — st. Z 435 ; 26-10-1973 ; 1 050 m ; 48° 40 N, 09° 53 W, 1 specimen, disarticulated — st. X 337 ; 15-10-1974 ; 1 870-2 000 m ; 44° 10 N, 05° 15 W ; 1 specimen, dry, curled up — st. Y 424 ; 01-09-1972 ; 780 m ; 41° 21 N, 09° 10 W ; 1 specimen, dry, curled up.

Norbi, st. CP 11 ; 28-07-1975 ; 300-350 m off Tromsø, Norway ; 3 specimens dry, curled up.

A true deep water species, originally described from Bohuslän, Sweden, and Bergen, Norway. G. O. Sars found it off the Norwegian coast (Hardanger) in a maximum depth of about 800 m, near Bodö and the Lofoten islands in 280-565 m, and near Hasvig, Söröen, Finnmark, in the same depth. I have seen specimens from that area in the Tromsø Museum collection, dredged in a minimum depth of 125 m (Rödöy, Tjötta, Finnmark), and a maximum depth of 385 m (Folden, Nordland). The present dredgings extend the bathymetrical range to 4 825 m.

The species was previously recorded from the Bay of Biscay (J. G. JEFFREYS, 1880 : “Travailleur” Exp. ; 1882 : 668, “Poreupine” Exp.) from 225-1 250 m. The “Travailleur” Expedition also recorded it from West of Portugal.

In the North West Atlantic it is known from the Gulf of St. Lawrence, between Cape Rosier and the S. W. point of Anticosti Island, 415 m, and from the Gulf of Maine, St. George’s Bank, 285 m.

VAYSSIÈRE (1913 : 32) erroneously recorded it from the British coast, where it actually never was found, and from the Mediterranean (Naples, Palerme, Dalmatie) probably on account of earlier records which are still in need of confirmation. R. A. VAN BELLE (1976 : 57, pl. 1) recorded two specimens from off the Mediterranean coast of Spain, province of Gerona, 200-250 m, but these were wrongly identified.

3. *Leptochiton cancellatus* (Sowerby II, 1840)

MATERIAL : “Thalassa”, st. Y 388 ; 29-08-1972 ; 920 m ; 41° 22 N, 09° 12 W ; 1 specimen, dry, curled up — st. Y 410 ; 31-08-1972 ; 360 m ; 40° 34 N, 09° 22 W : 1 specimen, dry, def. — st. Y 421 ; 31-08-1972 ; 450 m ; 41° 21 N, 09° 10 W ; 1 specimen, dry, curled up — st. Z 397 ; 22-10-1973 ; 511 m ; 47° 34 N, 07° 13 W ; 1 specimen, juv. — st. Z 398 ; 22-10-1973 ; 330 m ; 47° 36 N, 07° 17 W ; 1 specimen.

This species has been found throughout the region, from just below low water mark, living on stones, old shells, etc., its bathymetrical range now being extended to 920 m.

4. *Leptochiton leloupi*¹ nov. sp.
(Plate I)

MATERIAL : " *Thalassa* ", st. Z 407 ; 23-10-1973 ; 1 085 m ; 47° 44 N, 08° 07 W ; 1 specimen, holotype, curled up, partly broken (pl. I fig. 1) — st. Z 417 ; 24-10-1973 ; 865 m ; 48° 12 N, 09° 09 W, 2 specimens, paratypes, curled up and broken, one of them disarticulated (fig. 2, 4-6, 8-10) — st. Z 431 ; 25-10-1973 ; 800 m ; 48° 38 N, 09° 47 W, 1 specimen, paratype, curled up and broken, disarticulated (fig. 3, 7, 11-14).

DIAGNOSIS

Animal small, up to 4 mm long, elongate oval, moderately elevated, non-carinated, the valves not beaked, chalky white, dull (fig. 1). Central areas with rather widely separated longitudinal chains of irregularly shaped tubercles mostly composed of several granules cemented together especially on the pleurae, the interstices finely and irregularly granulose.

Head valve, lateral areas and post-mucronal area of tail valve with somewhat scale-like warts, on the end valves quincuncially arranged, on the lateral areas in about four radiating rows, the hindermost dentating the sutures ; at the same time the tubercles are arranged concentrically, separated by shallow grooves and lines of growth. Girdle narrow, with thin, elongate scales sculptured with 12-14 longitudinal riblets, and very few spines.

DESCRIPTION

Head valve semicircular, intermediate valves (fig. 2) about rectangular, regularly arched, the lateral areas decidedly raised, apophyses narrow, widely separated ; tail valve semicircular, mucro not prominent, about central, posterior slope slightly concave.

The sculpture of the head valve consists of irregular warts or scale-like tubercles, quincuncially arranged in curved series running from the hinder margin to the circumference in two directions, crossing each other rectangularly. Post-mucronal area of the tail valve sculptured likewise, the series of tubercles running from the faintly indicated ridges separating the post-mucronal area from the ante-mucronal area, to the outer margin.

Lateral areas of the intermediate valves with one radiating row of roundish tubercles along the posterior margin, finely dentating the suture, and three or four more radiating rows of somewhat scallike tubercles which are at the same time arranged in concentric rows, separated by shallow grooves and lines of growth. The central areas, as well as the ante-mucronal area of the tail valve, with longitudinal series of tubercles. On the pleurae there are parallel rows or chains of rather large, roundish tubercles, often composed of three

1. Named in honour of Dr. Eugène LELOUP, formerly curator of the Invertebrata Department, Institut royal des Sciences naturelles de Belgique, Bruxelles, whose numerous papers on Polyplacophora contributed so much to our present knowledge of these animals.

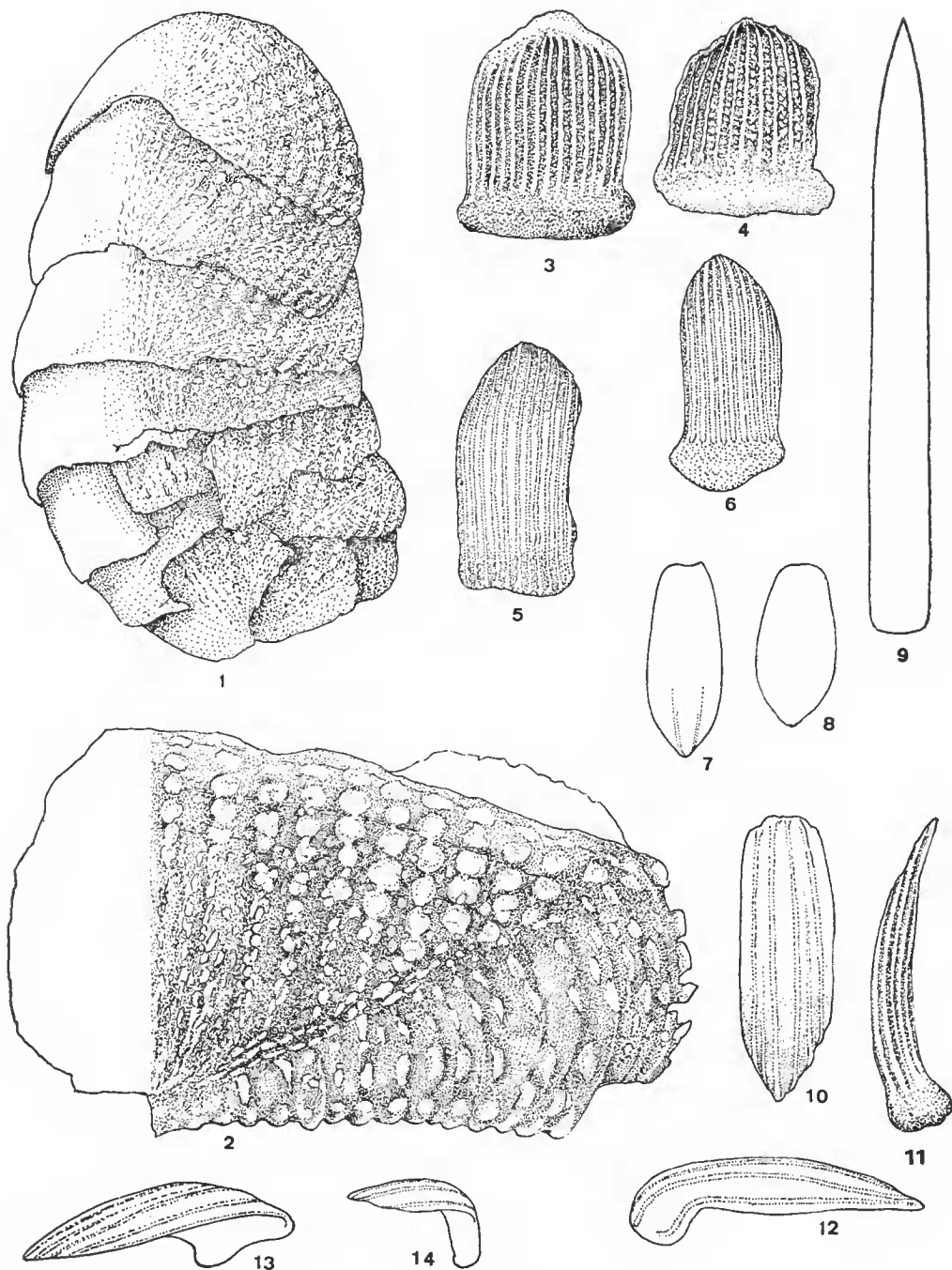


PLATE I

Leptochiton leloupi sp. nov.

1 : "Thalassa" 73, station Z 407, 1085 m. Holotype, 1.9 mm long, curled up and partly broken. — 2, 4-6, 8-10 : "Thalassa" 73, station Z 417, 865 m, paratype, curled up and broken, disarticulated. — 3, 7, 11-14 : "Thalassa" 73, station Z 431, 800 m, paratype, curled up, def., disarticulated.

1. Holotype, $\times 50$. — 2. Part of intermediate valve, dorsal side, $\times 100$. — 3, 4. Dorsal girde scales, $52 \mu \times 36 \mu$, and $48 \mu \times 40 \mu$ respectively. — 5, 6. Dorsal scales, near the suture, $75 \mu \times 36 \mu$, and $72 \mu \times 34 \mu$ respectively. — 7, 8. Ventral scales, $60 \mu \times 22 \mu$, and $50 \mu \times 24 \mu$ respectively. — 9. Dorsal spine, $192 \mu \times 17 \mu$. — 10. Marginal spicule-scale, $84 \mu \times 28 \mu$. — 11, 12. Do., $88 \mu \times 12 \mu$, and $92 \mu \times 16 \mu$ respectively. — 13, 14. Supra-marginal scales, side view, $84 \mu \times 26 \mu$ and $40 \mu \times 26 \mu$ respectively.

or more granules or pustules cemented together, the chains not quite parallel to the median axis of the animal but more or less converging toward the diagonal ridges. Near these ridges the tubercles fall apart into many small, differently shaped granules. In the rather wide interstices many small granules are irregularly disposed. On the jugum the rows are closer and less prominent, near the mucro only marked by irregular wavy grooves; only toward the front margin they are always indicated by a few larger tubercles.

The narrow girdle is dorsally clothed with very thin scales, about $50\ \mu$ long, $40\ \mu$ wide, curved, squarish at the base, rounded at the top, with 12-14 narrow, sharp riblets (fig. 3, 4). Near the sutures the scales are about twice as long as wide, $75\ \mu \times 35\ \mu$ (fig. 5, 6). There are very few dorsal spines, probably intersegmental, which are white, cylindrical, rather abruptly tapering to a sharp point like a Gothic candle stick, $192\ \mu \times 17\ \mu$ (fig. 9). There is a marginal fringe of bluntly pointed, curved spicules-scales, about twice as wide as thick, dorsally marked with 5 or 6 sharp but not prominent longitudinal riblets, about $90\ \mu$ long (fig. 10-14).

Ventrally the girdle is covered with radial rows of imbricating flat, very thin and transparent scales, elongately oval, the greatest width before the centre, distally obtusely pointed, truncated at the base, $50\ \mu \times 25\ \mu$ (fig. 8) with two, sometimes four, very weak and short riblets at the top (fig. 7).

Length 3,9 mm, width 2,4 mm (largest paratype).

DISCUSSION

Though the material at my disposal does not contain a single undamaged specimen I do not hesitate to introduce this new species on account of its peculiar sculpture, by which it is easily distinguished from undoubtedly related forms, such as *L. cancellatus* (Sowerby), and *L. scabridus* (Jeffreys).

In *L. cancellatus* the longitudinal rows of pustules on the central areas are so close that they are only separated by rows of pits, giving the surface a more or less latticed appearance. In *L. scabridus*, a strictly littoral species, the rows are further apart, but the granules in one row are rather widely separated; moreover the ventral girdle scales in that species are strongly 7-ribbed.

It is striking that the girdles of the two paratype specimens of *L. leloupi* that I dissected only contain one dorsal spine, probably from intersegmental origin, judging from its shape and length. In all related species there are always many small calcareous spicules mixed up with the dorsal girdle scales.

5. *Leptochiton tenuis* nov. sp.

(Plate II)

MATERIAL: "Thalassa", st. Z 430; 25-10-1973; 1 080 m; $48^{\circ} 37' N$, $09^{\circ} 52' W$; 1 specimen, curled up, holotype — st. Z 431; 25-10-1973; 800 m; $48^{\circ} 38' N$, $09^{\circ} 47' W$; 1 specimen, curled up, paratype — st. Z 435; 26-10-1973; 1 050 m; $48^{\circ} 40' N$, $09^{\circ} 53' W$; 6 specimens, of which 5 juvenile, 1 adult, disarticulated; paratypes.

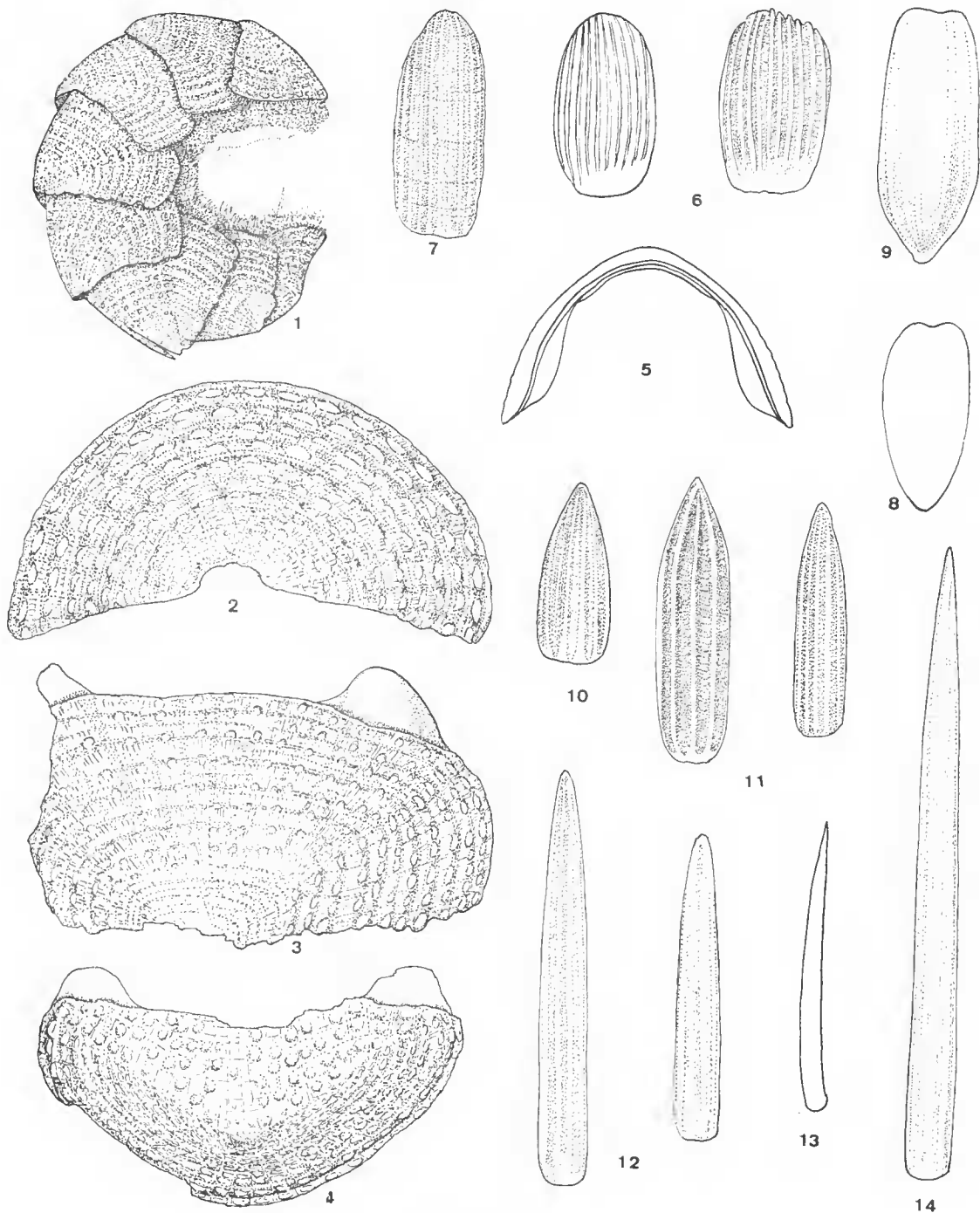


PLATE II

Leptochiton tenuis sp. nov.

- 1: Holotype "Thalassa", st. Z 430, 1080 m. — 2-14: Paratype. "Thalassa", st. Z 435, 1050 m.
 1. Holotype, $\times 25$. — 2. Valve I, dorsal side, $\times 50$. — 3. Valve IV, dorsal side, $\times 50$. — 4. Valve VIII, dorsal side, $\times 50$. — 5. Valve IV, anterior side, $\times 35$. — 6. Dorsal girdle scales, $64 \mu \times 36 \mu$. — 7. Sutural scale, $76 \mu \times 24 \mu$. — 8. Ventral girdle scale, $58 \mu \times 30 \mu$. — 9. Ventral scale, near outer margin, $84 \mu \times 32 \mu$. — 10. Supra marginal scale, $60 \mu \times 24 \mu$. — 11. Marginal spicules, $100 \mu \times 20 \mu$. — 12. Do., $140 \mu \times 16 \mu$ and $100 \mu \times 16 \mu$. — 13. Dorsal spicule, $100 \mu \times 7,5 \mu$. — 14. Sutural spicule, $212 \mu \times 18 \mu$.

DIAGNOSIS

Animal small, up to 3 mm long, elongate oval, very highly, angularly arched, not carinated, the valves only slightly mucronate, yellowish white (fig. 1). Tail valve, when seen from above, with the mucro behind the centre as a result of the steep, somewhat concave, posterior slope. Front margin of the intermediate valves a little emarginate, the lateral areas not raised, sculptured with concentric rows of elongate pustules, continuing on the central areas, where they are also arranged in radiating rows, diverging from the mucro toward the front margin. The pustules on the central areas small, roundish, wide apart. Head valve and post mucronal area of tail valve sculptured like the lateral areas, the antemucronal area like the central areas. Girdle narrow, with elongate oval, striated scales, small smooth spicules and stout, ribbed spines in pairs.

DESCRIPTION

Head valve semicircular (fig. 2), intermediate valves more or less rectangular (fig. 3), the front margin only very slightly curved inward between the widely separated, small, triangular apophyses, mucro perceptible, but far from prominent, not swollen, lateral areas not raised, only by their sculpture differentiated from the central area. All the valves are highly arched, the height about $\frac{3}{5}$ of the width, without a dorsal keel, the sides somewhat angularly bent (fig. 5). Posterior valve (fig. 4) more or less triangular, twice as wide as long, much smaller than the other valves, the mucro behind the centre, posterior slope steep, a little concave. Colour of the tegmentum yellowish white. All the valves are thin and brittle, the articulamentum being poorly developed.

The sculpture of the lateral areas consists of rather widely separated concentric series of elongate pustules, slightly dentating the sutures, the interstices not grooved, except for a few lines of growth. The series are continuous across the central areas, but here the pustules are roundish and small, at the same time arranged in radiating series diverging forwardly from the mucro. Head valve and postmucronal area of tail valve sculptured like the lateral areas. Here the pustules also show a quincuncial arrangement. The antemucronal area is sculptured like the central areas.

All the valves show fine, short, brown lines or scratchings in the interstices between the series of pustules.

Girdle moderately wide, dorsally clothed with very thin and transparent scales, elongate oval in shape, somewhat curved, $60\ \mu$ - $70\ \mu$ long, $35\ \mu$ - $40\ \mu$ wide, with 10-12 sharp riblets, narrower than the interstices (fig. 6), the sutural scales relatively longer, $76\ \mu \times 24\ \mu$ (fig. 7). Among the scales slender, smooth, somewhat curved, sharply pointed spicules occur, mostly isolated, $100\ \mu$ long, 7 - $8\ \mu$ wide (fig. 13). There are also pairs of much longer, faintly ribbed spines, irregularly disposed, 210 - $240\ \mu$ long, $18\ \mu$ wide (fig. 14). There is a dense marginal fringe of stout, elongate spicules-scales, with an abruptly tapering point, marked with five strong longitudinal ribs, $100\ \mu \times 20\ \mu$, and more weakly ribbed spiculae, 100 - $140\ \mu \times 16\ \mu$ (fig. 12).

On the ventral side the girdle is covered with radiating rows of small, very thin, flat, imbricating scales (fig. 8), $58 \mu \times 30 \mu$, oval in shape, obtusely pointed distally, truncated and somewhat emarginate at the base. Near the outer margin these scales are longer, $84 \mu \times 32 \mu$, with weak traces of about five riblets (fig. 9).

Length : ± 3 mm, breadth 2 mm (largest paratype, somewhat curled up).

DISCUSSION

L. tenuis is undoubtedly related to the Leptochitons of the *cancellatus*-group, on account of its girdle armature. It is easily distinguished, however, from other members of the group by its decidedly concentric arrangement of pustules on the tegumentum, the fine brown markings of the interstices, and its highly roofed general appearance.

6. *Leptochiton* sp. 1 (Plate III)

MATERIAL : "Thalassa", st. Z 397. 22-10-1973 ; 511 m ; $47^{\circ} 34' N$, $07^{\circ} 13' W$; 1 specimen disarticulated.

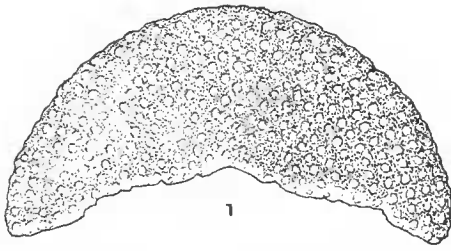
DESCRIPTION

The only specimen, 3.9 mm long, 2 mm wide, superficially resembles *L. tenuis*, as it is almost as highly arched, though the back is more evenly rounded (fig. 5), and the lateral areas are hardly or not recognizable. Moreover there is some resemblance in the sculpture of the tegumentum, the pustules also showing a more or less concentric arrangement. On the central areas, however, they are at the same time decidedly arranged in longitudinal rows, slightly diverging toward the front margin, separated by shallow grooves. As in *L. leloupi* the pustules are roundish, small and wide apart.

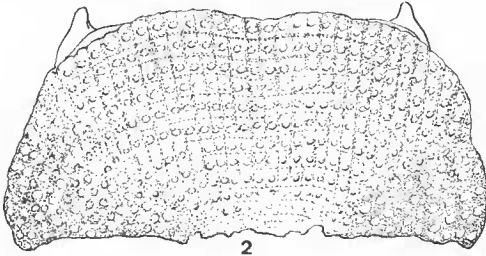
The front margins of the intermediate valves (fig. 2) are also somewhat emarginate. The tail valve (fig. 3, 4) is more or less triangular in shape, with the mucro behind the centre, though the length is $3/5$ of the width of the valve, whereas in *L. tenuis* it is only $1/2$.

In the girdle armature it differs rather widely from the latter. The dorsal side of the perinotum is clothed with thin, colourless, imbricating scales, strongly bent, marked with 14-16 sharp riblets, round topped, $36 \mu \times 36 \mu$ (fig. 6) ; only the sutural scales are longer, $88 \mu \times 36 \mu$, with less (10-12) riblets (fig. 7). Among the scales slender, white spicules are found, rising from chitinous cups, $192 \mu \times 18 \mu$ (fig. 13). On the perinotum tongues between the valves pairs of longer, stout, intersegmental spines occur, rather weakly ribbed, $216 \mu \times 25 \mu$ (fig. 14). There is a fringe of marginal spicules-scales, weakly 8-ribbed, somewhat angularly curved near the base, twice as wide as thick, 85-90 μ long, 32 μ wide (fig. 11, 12). Ventral scales arranged in radiating, imbricating series, flat and thin, about oval in shape, obtusely pointed distally, truncated and a little emarginate at the base, $88 \mu \times 36 \mu$, toward the outer margin becoming relatively longer (fig. 8, 9), sometimes with 5 or 6 hardly perceptible riblets, especially near the top (fig. 10).

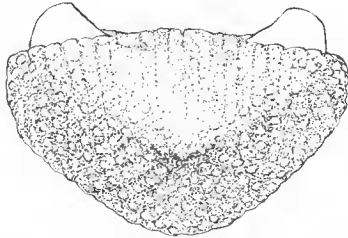
The colour of the specimen is whitish, without brown markings or scratches between the rows of pustules.



1



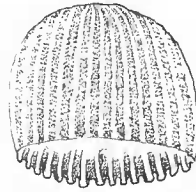
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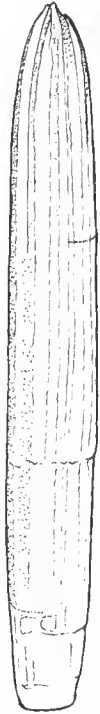
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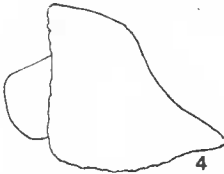
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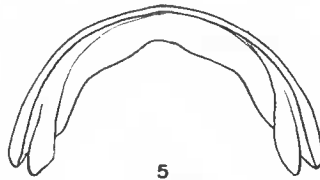
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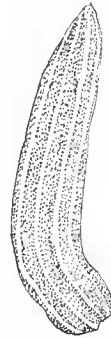
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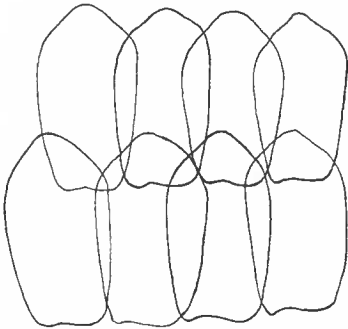
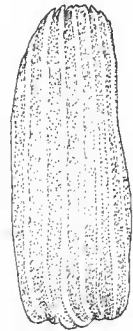
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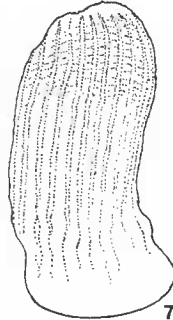
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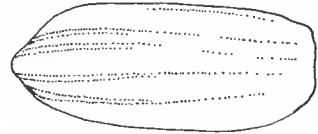
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8



7



10



9



DISCUSSION

Though the specimen described above is certainly not conspecific with any other *Leptochiton* species in the area I think it wiser to wait for more material before introducing it as a new species.

7. *Leptochiton* sp. 2 (Plate IV)

MATERIAL: "Thalassa", st. Y 400; 30-08-1973; 800 m; 40° 45' N, 09° 19' W; 1 specimen, dry, curled up, now disarticulated.

DESCRIPTION

Animal elongate oval, rather elevated, the height about 0.45 of the breadth, not carinated (fig. 4).

Head valve semicircular, sculptured with radiating rows of roundish granules, interrupted by concentric lines of growth.

Intermediate valves (fig. 2, 4) somewhat rectangular, only slightly beaked, the anterior margin a little emarginate, lateral areas decidedly raised, sculptured like the anterior valve; the central area with longitudinal rows of roundish granules, stringed together, the grooves between the strings rather deep, about half as wide as the granules. On the jugal part of the valves there are about eight parallel rows, more weakly developed, the four or five adjoining rows on the pleurae are curved as a result of short interpolated rows, posteriorly as well as anteriorly; the remaining pleural rows are parallel again, somewhat diverging toward the anterior margin (fig. 5). The apophyses are widely separated, rather small, more or less triangular.

Tail valve (fig. 3) rather semi-oval than semi-circular, the length about 5/8 of the breadth, the mucro not swollen, a little before the centre, the posterior slope concave just behind the mucro, the apophyses well developed, subtriangular. Ante-mucronal area sculptured like the central areas, post-mucronal area like the head valve.

Colour of the tegmentum pale brownish or roseate; inside white.

The dorsal side of the girdle is clothed with elongate, erect, calcareous scales of different sizes, not imbricating, with 5 (-7) rather strong ribs, obtusely pointed, 64 μ -128 μ long,

PLATE III

Leptochiton sp. 1. "Thalassa" 73, st. Z 431.

1. Valve I, dorsal side, $\times 38$. — 2. Valve V, dorsal side, $\times 38$. — 3. Valve VIII, dorsal side, $\times 38$. — 4. Lateral view of valve VIII, $\times 38$. — 5. Valve V, anterior side, $\times 38$. — 6. Dorsal girdle scale, 36 $\mu \times 36 \mu$. — 7. Dorsal girdle scale, near the suture, 88 $\mu \times 36 \mu$. — 8. Arrangement of ventral girdle-scales, 52 $\mu \times 28 \mu$. — 9. Ventral scale, near to the margin, 88 $\mu \times 25 \mu$. — 10. Ventral scales near to margin, 88 $\mu \times 36 \mu$ and 88 $\mu \times 27 \mu$. — 11. Supra-marginal scale, 88 $\mu \times 34 \mu$. — 12. Marginal spicule-scales, 85 $\mu \times 32 \mu$. — 13. Dorsal spicule, 192 $\mu \times 18 \mu$. — 14. Intersegmental spine, 216 $\mu \times 25 \mu$.

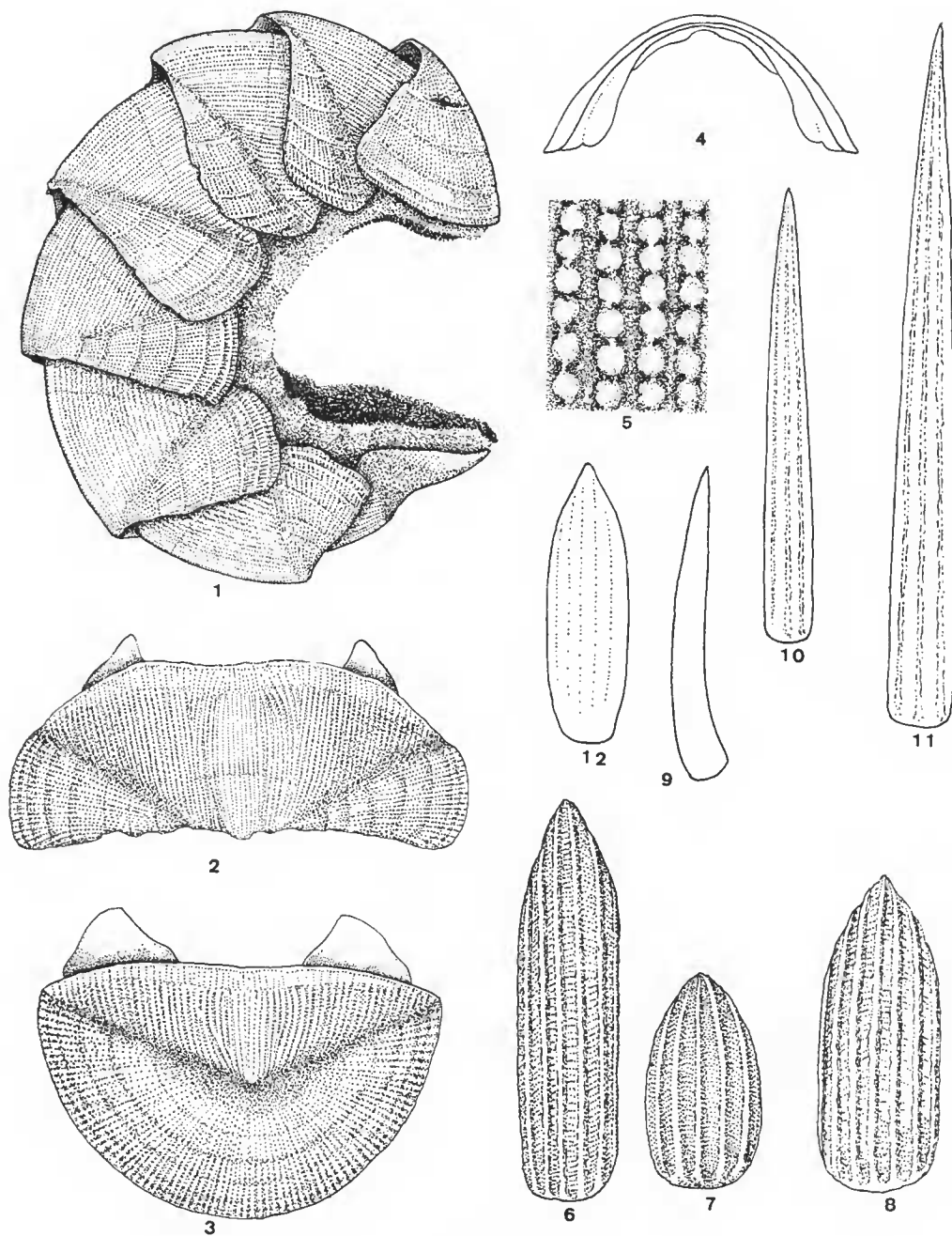


PLATE IV

Leptochiton sp. 2. "Thalassa" 73, st. Y 400, 800 m.

1. Whole specimen, 7,2 mm long, curled up, $\times 11$. — 2. Valve IV, dorsal side, $\times 13$. — 3. Valve VIII, dorsal side, $\times 13$. — 4. Valve IV, anterior side, $\times 9$. — 5. Detail of sculpture, pleural side of central area, $\times 90$. — 6-8. Three types of dorsal girdle scales, $128 \mu \times 30 \mu$, $64 \mu \times 36 \mu$ and $108 \mu \times 36 \mu$, respectively. — 9. Dorsal spicule, $100 \mu \times 16 \mu$. — 10. Marginal spicule, $140 \mu \times 16 \mu$. — 11. Intersegmental spicule, $220 \mu \times 20 \mu$. — 12. Ventral scale, $88 \mu \times 25 \mu$.

30 μ -36 μ wide (fig. 6-8). Among the scales, irregularly scattered, calcareous spicules occur, straight or somewhat curved, smooth, sharply pointed, 100 μ long, 16 μ thick (fig. 9). On the perinotum tongues between the valves groups of 2-4 weakly ribbed, gradually tapering, intersegmental spines are found, rising from chitinous cups, 220 μ long, 20 μ thick (fig. 11). There is a marginal fringe of equal, but smaller spines, 140 μ long, 16 μ thick (fig. 10). Ventrally the girdle is armed with elongate, flat imbricating scales, sometimes with traces of about five riblets, in rows perpendicular to the outer margin. The scales are truncated at the base, distally regularly tapering to a blunt point, 88 μ long, 25 μ wide (fig. 12).

Length : \pm 10 mm when stretched. The only specimen measures 7.2 mm, but it is strongly curled up.

DISCUSSION

This is undoubtedly a new species. It was labelled "*Lepidopleurus alveolus* Sars", which is no wonder, for the general appearance is quite alike. Only the granulation of the tegmentum, the distinctly raised lateral areas, and the clothing of the perinotum are different in all respects. It differs from *L. asellus* mostly by its higher elevation, the raised lateral areas, and the shape of the tail valve. Apart from being much larger it differs from *L. cancellatus* by the armature of the girdle, and also by the shape of the tail valve.

Meanwhile I hesitate to propose a new name for it, preferring to wait for more material.

8. *Hanleya hanleyi* (Bean, in Thorpe, 1844)

MATERIAL : "Thalassa", st. W 375 ; 6-10-1970 ; 200-375 m ; 43° 37' N, 03° 36' W ; 1 specimen, dry, curled up — st. Z 427 ; 25-10-1973 ; 330 m ; 48° 27' N, 09° 48' W ; 1 specimen, dry, curled up.

DISCUSSION

H. hanleyi is known from the N.E. Atlantic, from Finnmark to Portugal, the Açores, and the Mediterranean Sea, in a minimum depth of 10-15 m.

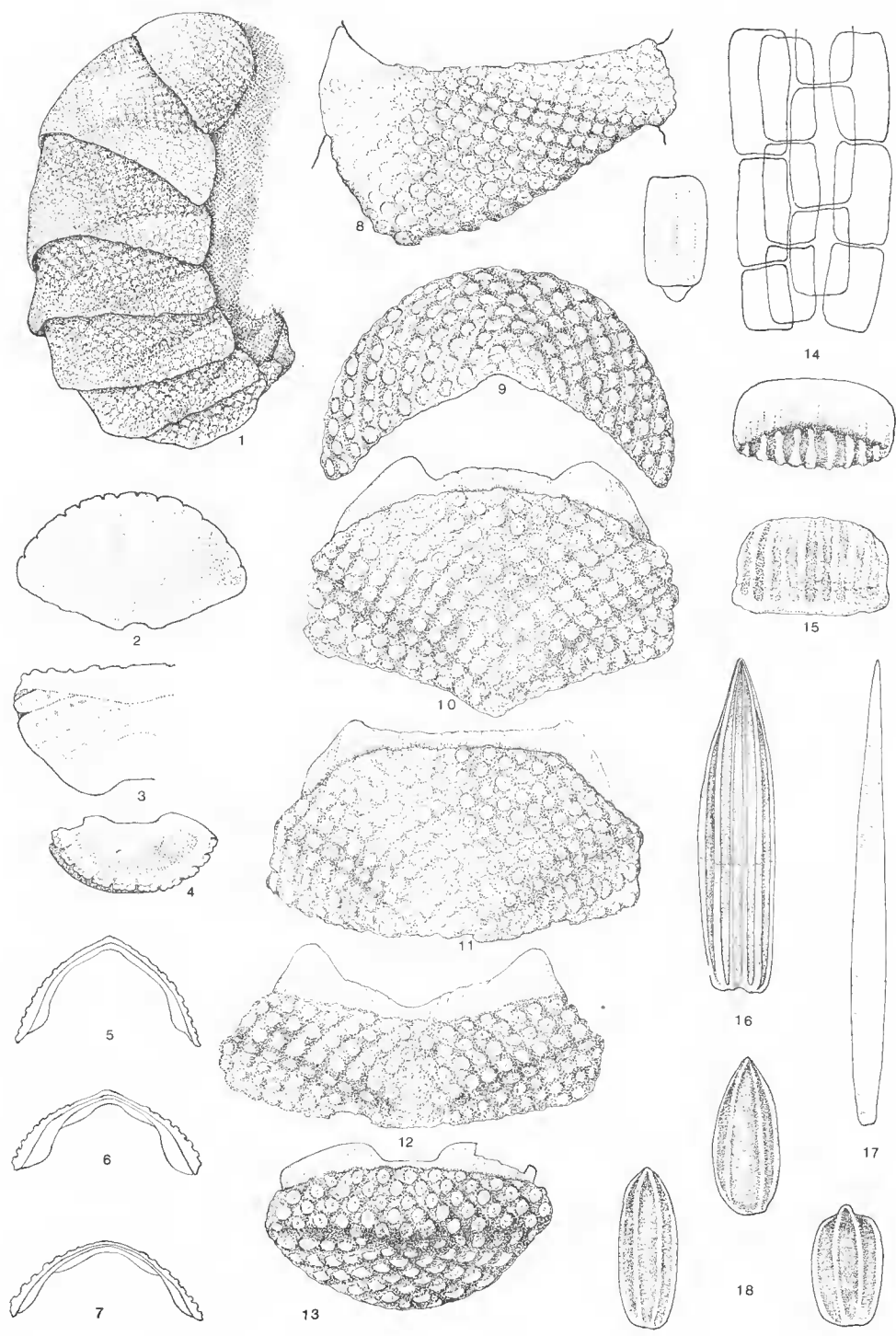
It was first recorded from the area by F. DANIEL in 1883, off Brest.

9. *Connexochiton platynomenus* nov. gen., nov. sp. (Plate V)

The "Thalassa" material contains three small specimens of an Ischnochitonoid apparently representing an unknown species which does not fit into any described genus, so I decided to create a new one for it within the family of Ischnochitonidae.

DIAGNOSIS OF THE GENUS

The shell valves with very short, propped insertion teeth. Head and tail valves multislit (\pm 10), intermediate valves with a single slit at both sides. Apophyses moderate,



connected by a lamina across the jugal sinus, not separated from the apophyses by notches, though the laminae themselves are very slightly notched and grooved in between. Sculpture of the tegmentum consisting of round, flat granules, arranged in quineunx. Girdle with imbricating, striated scales.

Type : *Connexochiton platynomenus* nov. sp. (o.d., this paper).

MATERIAL : "Thalassa", st. Z 431 ; 25-10-1973 ; 800 m ; 48° 37 N, 09° 52 W : 1 specimen (holotype), slightly damaged ; 1 specimen, def. (paratype) — st. Z 435 ; 26-10-1973 ; 1 050 m ; 48° 40 N, 09° 53 W ; 1 specimen, now disarticulated (paratype).

DIAGNOSIS OF THE SPECIES

Animal small, up to 3 mm, elongate oval (fig. 1), anteriorly highly arched, rapidly flattening posteriorly ; length of the valves also diminishing, the anterior part of the animal decidedly carinated, the posterior part more regularly bent. Lateral areas raised. Tegmentum sculptured with round, flat, rather widely spaced, and relatively large granules arranged in quineunx as well on the central as on the lateral areas. Girdle with short, roundly edged, ribbed scales and a marginal fringe of pointed, ribbed spicules-scales.

DESCRIPTION

Head valve (fig. 2, 9) semi-circular, highly elevated, the length 0,68 of the breadth, the posterior margin somewhat sinuate. Valves II (fig. 10) and III (fig. 11) as highly elevated (height : breadth = 0,67), decidedly carinated, rather long, the length 0,4 of the breadth ; valve IV (fig. 12) and subsequent valves (fig. 3, 6, 7) much less elevated (height : breadth = 0,43) and much shorter (valve IV, length : breadth = 0,21) ; the tail valve (fig. 4, 13) small, nearly twice as broad as long, the mucro not prominent, about central, posterior slope slightly concave. All the intermediate valves have the lateral areas distinctly raised. The apophyses of the valves II-VII are somewhat triangular in shape, of VIII evenly rounded.

PLATE V

Connexochiton platynomenus, gen. nov., sp. nov.

1, 8 : Holotype : "Thalassa" 73, st. Z 431, 800 m, 1 specimen in alcohol, curled up. — 2-7, 9-18. Paratype : "Thalassa" 73, st. Z 435, — 1050 m, disarticulated.

1. Holotype, $\times 27$. — 2. Valve I, ventral side, $\times 32$. — 3. Valve V, ventral side, $\times 32$. — 4. Valve VIII, ventral side, $\times 32$. — 5. Valve II, anterior side, $\times 27$. — 6. Valve IV, anterior side, $\times 27$. — 7. Valve V, anterior side, $\times 27$. — 8. Valve III, $\times 43$. — 9. Valve I, dorsal side, $\times 54$. — 10. Valve II, dorsal side, $\times 54$. — 11. Valve III, dorsal side, $\times 54$. — 12. Valve IV, dorsal side, $\times 54$. — 13. Valve VIII, dorsal side, $\times 54$. — 14. Ventral girdle scales, the longest $44 \mu \times 16 \mu$. — 15. Dorsal girdle scales $64 \mu \times 38 \mu$. — 16. Marginal spicule-scale, $68 \mu \times 16 \mu$. — 17. Marginal spicule, $188 \mu \times 12 \mu$. — 18. Supra-marginal scales, 24-32 μ long, 12-14 μ wide.

The jugal sinus is flat and shallow as a result of a considerable laminate extension of the articulation, connecting the apophyses. These sutural plates are very slightly notched, the notches corresponding with faint grooves, but they are never separated from the apophyses by prominent slits.

The sculpture of the tegmentum is most peculiar and unpreceded in any other species of the family, consisting of relatively large, round, flat-topped granules, neatly arranged in quineunx as well on the central as on the lateral areas. As a result they are also arranged in radial rows on the lateral areas. Colour of all the valves chalky white. Valve I with 11, intermediate valves with 4-4, valve VIII with 9-10 slits. The insertion plates very short, the teeth decidedly propped, especially in the tail valve; the eaves narrow, solid.

Girdle moderately wide. The dorsal side covered with imbricating small, strongly bent, calcareous scales arranged in quineunx; the scales about twice as wide as long, with 9-10 well pronounced ribs extending to the flattish rounded top, as wide as the intervals, $64 \mu \times 38 \mu$ (fig. 15). The supra-marginal scales being smaller, somewhat elongate, with only four ribs, more or less obtusely pointed, $24-30 \mu$ long, $12-14 \mu$ wide (fig. 18). There is a marginal fringe of elongate spicules-scales, about triangular in diameter, parallel-sided, abruptly tapering to a point, with 5 or 6 ribs on the dorsal side, $68 \mu \times 16 \mu$ (fig. 16), and a few longer, smooth needles, $180 \mu-200 \mu$ long, $12-16 \mu$ thick (fig. 17). The ventral side of the girdle is clothed with rectangular scales in radial rows, the rows partly covering each other. Some of the scales, especially near the outer margin, are indistinctly marked with faint riblets (fig. 14).

Length 23 mm, breadth 16 mm (holotype, partly curled up).

DISCUSSION

Connexochiton platynomenus is quite unlike any other species known up to now. I placed the new genus in the family of Isechnochitonidae on account of the characteristics of the girdle. It resembles *Lepidozonia* in the presence of sutural laminae, though these are not separated from the apophyses by notches as in the latter genus. Sutural laminae and propped insertion teeth are distinguishing features of the Callochitonidae, but those have the insertion plates of the intermediate valves multi-slit and are equipped with shell-eyes, which *Connexochiton* is not.

Apparently the habitat of this new species is restricted to deep parts of the North-East Atlantic, otherwise it would have been discovered much earlier in this well investigated area.

10. *Isechnochiton (Stenosemus) albus* (Linnaeus, 1767)

MATERIAL : BIAÇORES, st. 197 ; 05-11-1971 ; 845 m ; $37^{\circ} 49' N$, $25^{\circ} 01' W$ (Açores) ; 1 specimen, juv. in alcohol.

DISCUSSION

S. albus is a well known circum-boreal and arctic species, which was previously recorded from the Bay of Biscay and the Açores by DAUTZENBERG (1927).

11. *Ischnochiton (Stenosemus) exaratus* (G. O. Sars, 1878)

MATERIAL : “ *Thalassa* ”, st. W 419 ; 11-10-1970 ; 880-1 000 m ; 43° 48 N, 06° 12 W ; 1 specimen, dry — st. W 437 ; 13-10-1970 ; 500-600 m ; 44° 11 N, 08° 39 W ; 1 specimen, dry — st. X 340 ; 16-10-1971 ; 860-910 m ; 44° 07 N, 04° 30 W ; 1 specimen, in alcohol — st. Z 396 ; 22-10-1973 ; 850 m ; 47° 32 N, 07° 06 W ; 1 specimen def., dry.

DISCUSSION

This is a first record of another deep water species from the Bay of Biscay. *Ischnochiton exaratus* inhabits both sides of the Northern Atlantic. It was described by G. O. Sars from the Norwegian West coast (Bodö, and Florö, 100-200 fms). I have seen specimens from Bergen, Trondheimfjord, North to Senja (150-590 m), but not from Finnmark, nor Svalbard (Spitsbergen). ÖSKARSSON (1961) reported it from Iceland (470 m), KAAS (1972) from Grönland (specimens in the R. Mus. nat. Hist. Leiden), VERRILL (1882) from the New England coast (off Martha's Vineyard, 101-194 fms) and DALL (1889) from off Fernandina, Florida (294 fms).

THIELE (1908) also mentioned it from Punta Arenas, but it is possible that he confounded it with *Ischnochiton dorsuosus* (Haddon, 1886) which is much alike. This is also the opinion of DE CASTELLANOS (1956 : 473). DAUTZENBERG and FISCHER (1896 : 101) in their turn reported *Ischnochiton dorsuosus* from the Açores (Exp. “ *Hirondelle* ”, 454 m). That species was also reported by RIGHI (1971 : 124) from near Rio de Janeiro (“ *Calypso* ” Exp., st. 1776 ; 24° 54 S, 44° 26 W ; 1 000 m). Thanks to Dr G. TESTA of the Département des Collections, Musée Océanographique, Monaco, I could study the only specimen from the Açores mentioned above. It proves to be *I. (S.) exaratus* without any doubt. I have not seen the Rio specimen. *I. (S.) dorsuosus* differs in a few minor details, as I could ascertain by examining the unique type, reg. no. 1889.11.9.8 in the British Museum (Nat. Hist.), which was kindly entrusted to me by Ms K. M. WAY, keeper of the Mollusca section of that museum.

E. LELOUP (1956 : 41) described *I. exaratus* from Southern Chile (47° 51 S, 72° 55 W ; 100 m, and 42° 26 S, 72° 59 W ; 250-300 m). Thanks are due to Dr ROY OLERÖD, curator of the Naturhistoriska Riksmuseet, Stockholm, for the loan of one of these specimens, which enabled me to confirm Dr LELOUP's identification. I also thank Dr A. J. FERREIRA, California Academy of Sciences, for sending me a fine photograph of the holotype of *Lepidopleurus (Leptochiton) nicomedes*, described by W. H. DALL (1919 : 501) from off Nelson Strait, S. Chile (51° 52 S ; 348 fms), kept in the U.S. natn. Mus., reg. no. 96935. There is no doubt that DALL's species falls into the synonymy of *I. (S.) exaratus*.

The loose valves VAN BELLE (1977 : 28) mentioned from near the Isle of Malta, Mediterranean Sea (480-530 m), identified with all reserve by that author as *I. dorsuosus*, do not belong to the present species ; they much resemble *Ischnochiton obtusus* Carpenter in PILSBRY, 1893, in the shape of the valves and their sculpture, though not in colour, as I could establish after studying the unique type of *I. obtusus* in the Brit. Mus. (Nat. Hist.), reg. nr. MC 105. *I. obtusus* was described from Portugal.

12. *Placiphorella (Placophoropsis) atlantica* (Verrill and Smith, 1882)

MATERIAL : Noratlante, 1969, st. 128 ; 00-00-1969 ; 1 174 m ; 47° 41 N, 08° 06 W ; 2 specimens in alcohol.

Biogas 111, st. CV 22 ; 23-08-1973 ; 1 331 m ; 47° 42 N, 08° 19 W ; 1 specimen in alcohol.

“ Thalassa ”, st. Z 452 ; 28-10-1973 ; 1 420-1 470 m ; 48° 42 N, 10° 53 W ; 2 specimens, dry.

Biaçores, st. 180 ; 03-11-1971 ; 1 070-1235 m ; 37° 57 N, 25° 33 W ; 2 specimens in alcohol.

DISCUSSION

Another first record for the Bay of Biscay. Only few specimens of *P. atlantica* are known. It was described by VERRILL and SMITH from the N. W. Atlantic (“ Albatross ” 40°01 N, 68°54 W ; 1190 m, and 42°15 N, 65°49 W ; 227 m). In 1898, LOCARD redescribed it under the name of *Chiton coronatus* Fischer MS after specimens procured by the “ Talisman ” Exp. W of Soudan, 640 m. Afterwards these were recognized as *P. atlantica* by THIELE (1909 : 31).

DAUTZENBERG (1927 : 231) recorded specimens from near the Açores (880-1385 m) dredged during the expeditions of Prince Albert I of Monaco.

RÉFÉRENCES

- BEAN, W., 1844. — *In* : THORPE, C., British marine conchology ; being a descriptive catalogue, arranged according to the Lamarckian system, of the salt water Shells in Great Britain. Lumley, Londres.
- BELLE, R. A. VAN, 1975. — Sur la présence en Méditerranée de *Lepidopleurus alveolus* (Lovén, 1846). *Inf. Soc. belge Malac.*, **4** (3) : 57-58, fig. 1-4.
- 1977. — Nota's over minder gekende keverslakken van de Middellandse Zee. *Gloria Maris*, **16** (2) : 27-35, pl. 1.
- CASTELLANOS, Z. J. A. DE, 1956. — Catalogo de los Poliplacóforos argentinos y de aguas vecinas al estrecho de Magallanes. *Revta Mus. La Plata, Zool.*, N.S., **6** : 465-486, pl. 1-19.
- DALL, W. H., 1889. — A preliminary catalogue of the Shell-bearing marine Mollusks and Brachiopods of the South-eastern coast of the United States. *Bull. U. S. natn. Mus.*, **37** : 1-221, pl. 1-74.
- 1919. — Descriptions of new species of chitons from the Pacific coast of America. *Proc. U.S. natn. Mus.*, **55** : 499-516.
- DANIEL, F., 1883. — Faune malacologique terrestre, fluviatile et marine des environs de Brest (Finistère), 2^e partie. *J. Conch.*, **31** : 330-391.
- DAUTZENBERG, P., 1927. — Mollusques provenant des campagnes scientifiques du Prince Albert I^{er} de Monaco dans l'océan Atlantique et dans le golfe de Gascogne. *Résult. Camp. scient. Albert I*, **72** : 1-400, pl. 1-9.
- DAUTZENBERG, P., et H. FISCHER, 1896. — Dragages effectués par l'Hirondelle et par la Princesse Alice 1888-1895 : I. Mollusques Gastéropodes. *Mém. Soc. zool. Fr.*, **21** : 395-498, pl. 15-22.

- HADDON, A. C., 1886. — Report on the Polyplacophora collected by H.M.S. "Challenger" during the years 1873-1876. *Challenger Rep.*, **15** (43) : 1-50, pl. 1-3.
- JEFFREYS, J. G., 1882. — On the Mollusca procured during the « Lightning » and « Porcupine » Expeditions, 1868-70 (part V). *Proc. zool. Soc. Lond.*, **1882** : 656-687, pl. 49-50.
- KAAS, P., 1972. — Polyplacophora of the Caribbean region. *Stud. Fauna Curaçao*, **41** (137) : 1-162, pl. 1-9.
- LELOUP, E., 1956. — Polyplacophora. Reports of the Lund University Chile Expedition 1948-1949, no. 27. *Acta Univ. Lund, Andra Avd., N.S.*, **52** : 1-94, fig.
- LOCARD, A., 1898. — Mollusques testacés, 2. *Exp. Sci. Travailleuse Talisman* : 1-515, pl. 1-18.
- LOVÉN, S., 1846. — Index Molluscorum litora Scandinaviae occidentalia habitantium. *Öfvers. K. Vetensk.Akad. Förh.*, **3** : 134-160.
- ÓSKARSSON, I., 1961. — Note on some rare and new species of Mollusca off the coast of Iceland. *Náttúrufræðingurinn*, **30** : 176-187, fig. 1-9.
- RIGHI, G., 1971. — Moluscos Poliplacóforos do Brasil. *Papéis avuls. Zool. S. Paulo*, **24** : 123-126, fig. 1-60.
- SARS, G. O., 1878. — Mollusca regionis arcticae norvegiae. Christiania, 1878.
- SMITH, A. G., 1960. — Amphineura, in : Treatise on Invertebrate Paleontology, part I, Mollusca 1. University of Kansas Press.
- SOWERBY, G. B., 1840. — The Conchological Illustrations parts 165-168. Londres.
- THIELE, J., 1908. — Die Antarktischen und Subantarktischen Chitoncn. *Dt. Südpol.-Exped.*, **10** (2) : 7-23, pl. 1.
- 1909-1910. — Revision des Systems der Chitoncn. *Zoologica Stuttg.*, **22** : 1-132, pl. 1-10.
- VAYSSIÈRE, A., 1913. — Mollusques de la France et des régions voisines, 1. Doin, Paris.
- VERRILL, A. E., 1882. — Catalogue of marine Mollusca added to the fauna of the New England region, during the past ten years. *Trans. Conn. Acad. Arts Sci.*, **5** (2) : 447-588, pl. 42-44.
- VERRILL, A. E., S. I. SMITH, 1882. — In : VERRILL, Notice of the remarkable marine fauna occupying the outer banks off the Southern coast of New England, n° 7, and of some additions to the Fauna of Vineyard Sound. *Am. J. Sci.*, 3^o ser., **24** : 360-371.

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